ONE
Concepts of Project Management

Project management is fast becoming an exciting new profession. Project managers are in great demand. They may be required for a publishing house, a university, agricultural rural development, social work or industrial construction projects. It appears they are required wherever there is work. Project management seems to have captured the attention of all those who are looking for results. The prospects were not so bright some years ago. For that matter, even now, none of the universities in India offer a full-fledged degree course in project management. This necessarily poses a problem. What a project manager does in Company 'X' is not the same as what another does in Company 'Y'. Today anyone holding a responsible position in a project is a Project Manager—and if he pursues his own style in discharging his so-called project management responsibilities, he can hardly be blamed.

CONCEPT OF A PROJECT

To understand project management we must first understand what a project really is. We hear of cement projects, power projects, refinery projects, fertilizer projects, etc., but while the term project is common to all of them, the plants are not. In each case the project is for the plant but as soon as the plant is operational, the project is deemed to be completed. Similar is the case with any other project—say a project for methods improvement. The project is complete when methods improvement has been achieved. The explicit use of the term 'project' is not always necessary, even then it could be considered a project—our Lok Sabha election is such an example.

A project, therefore, is not a physical objective, nor is it the end-result—it has something to do with the goings-on in between, which must be same, whether we build a high technology process plant or merely hold an election, to deserve a common name and to be termed as a project.

To understand what a project is, let us study how a project is conceived. In a business setting, whether in the public or private sector, an organisation must grow at least for the sake of its survival. The organisation, therefore, is continuously on the lookout for good business ideas which may require growth, either on the existing lines of business or in diversified areas. But the idea must be technically feasible, economically viable, politically suitable and socially acceptable. Once the ideas pass these tests, an investment proposal is made. When the investment proposal is approved, the project commences.

A project is, thus, initiated to achieve a mission—whatever the mission may be. A project

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is completed as soon as the mission is fulfilled. The project lives between these two cut-off points and, therefore, this time-span is known as *project life cycle*.

What then is a project? It starts from scratch with a definite mission, generates activities involving a variety of human and non-human resources all directed towards fulfilment of the mission and stops once the mission is fulfilled. The Project Management Institute, U.S.A. has a good definition for it. A project, according to the Institute, is a one-shot, time-limited, goal-directed, major undertaking, requiring the commitment of varied skills and resources." It also describes a project as "a combination of human and non-human resources pooled together in a temporary organisation to achieve a specific purpose." The purpose and the set of activities which can achieve that purpose distinguish one project from another.

CHARACTERISTICS OF A PROJECT

A project is typified by its various characteristics. To start with, a project is a big work—but it is basically *a work*—one whole thing. This means that while there may be contributions from many different people, it can still be recognised as one whole thing. A comparison can be made with a book to fully understand it. While there may be many chapters in the book, sometimes written by different authors, the book is a single entity and is supposed to serve a single purpose. The various works that constitute the whole are inter-related and together they tell the whole story. In the same way, all works that are inter-related and are being performed to serve a common purpose can be grouped together and termed as a *project*, only if it could be made into a composite affair. When this approach for grouping of work is used in any work environment, we may say that work has been 'projectised'.

With a project, we have seen that there is a concept of wholeness despite diversities of work. The concept of wholeness does, of course, exist in a factory, an office or in any other work situation also. The difference is that in case of a project the *whole* has to be completed in one shot—once and for all. It is not a process that can perpetuate. It can, of course, be repeated but only in blocks of *whole*, similar to *batch* mode of production in a factory.

Also, with a project there is some sort of a missionary zeal, an unknown force, pushing people forward for achievement of something beyond their immediate work. The completion of one's own work, and whatever it may result in, does not seem to be what one is really working for in a project. One would never say that one's project is complete till the *whole thing* is complete and is performing satisfactorily. That is the spirit of the project, which makes everyone feel important, contributing to a big cause, though in reality he may actually be a very small cog in the big wheel of the project.

The special features of a project that would differentiate it from any other ongoing activity, say production, can be summarised as in Table 1.1.

Project Family Tree

A project normally originates from a plan—national plan or corporate plan. In the normal scheme of things, the family tree for a project would be as in Fig. 1.1. Sometimes, however, the term project may be used for what should be termed as programme or work package. This is not quite unexpected in view of their closeness in the hierarchy. A programme is not the same thing as a project; for one thing, it is not time limited like a project and also its scope and boundaries are not so well delineated. It is, however, another thing that the approach for management of programmes may be the same as that for a project.

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TABLE 1.1 Characteristic features of a project

S. No.		Characteristic Features
1.	Objectives	A project has a fixed set of objectives. Once the objectives have been achieved, the project ceases to exist.
2.	Life span	A project cannot continue endlessly. It has to come to an end. What represents the end would normally be spelt out in the set of objectives.
3.	Single entity	A project is one entity and is normally entrusted to one responsibility centre while the participants in the project are many.
4.	Team work	A project calls for team work—the team again is constituted of members belonging to different disciplines, organisations and even countries.
5.	Life cycle	A project has a life cycle reflected by growth, maturity and decay. It has, naturally, a learning component.
6.	Uniqueness	No two projects are exactly similar even if the plants are exactly identical or are merely duplicated. The location, the infrastructure, the agencies and the people make each project unique.
7.	Change	A project sees many changes throughout its life. While some of these changes may not have any major impact, there can be some changes which will change the entire character or course of the project.
8.	Successive principle	What is going to happen during the life cycle of a project is not fully known at any stage. The details get finalised successively with the passage of time. More is known about a project when it enters the construction phase than what was known, say, during the detailed engineering phase.
9.	Made to order	A project is always made to the order of its customer. The customer stipulates various requirements and puts constraints within which the project must be executed.
10.	Unity in diversity	A project is a complex set of thousands of varieties. The varieties are in terms of technology, equipment and materials, machinery and people, work culture and ethics. But they remain inter-related and unless this is so they either do not belong to the project or will never allow the project to be completed.
11.	High level of sub-contracting	A high percentage of the work in a project is done through contractors. The more the complexity of the project, the more will be the extent of contracting. Normally around 80% of the work in a project is done through sub-contractors.
12	Risk and uncertainty	Every project has risk and uncertainty associated with it. The degree of risk and uncertainty will depend on how a project has passed through its various life-cycle phases. An ill-defined project will have extremely high degree of risk and uncertainty. Risk and uncertainty are not part and parcel of only R & D projects—there simply cannot be a project without any risk and uncertainty.

Plan	National/Corporate plan with targets for growth.
↓ Programme	Health programme, educational programme, science and technology programme.
↓ Project	Power plants, schools, hospitals, housing projects.
↓ Work Package	Water supply and distribution package, power supply and distribution package.
↓ Task	Award of water supply contract, construction of foundations.
↓ Activity	Excavation, laying of cable, preparation of drawings, preparation of specifications.

FIG. 1.1 Project family tree

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Similarly, a work package is not a project though it may be so treated for the purpose of its management. Several work packages will constitute a project. A work package, however, has to be time limited as there is absolutely no ambiguity regarding its scope and boundaries.

Categories of Project

Much of what the project will comprise and consequently its management will depend on the category it belongs to. The location, type, technology, size, scope and speed are normally the factors which determine the effort needed in executing a project. Figure 1.2 shows the various categories into which industrial projects may be fitted. A grass root mega-high technology project is not the same thing as a modification work in a low technology mini plant—though both will be seen as projects. Therefore, though characteristics of all projects are the same, they cannot be treated alike. An R & D project even though value-wise it may belong to the mini category, it must not receive the same attention as a low-technology mini plant. Recognition of this distinction is important for management of project. Projects are often categorised in terms of their speed of implementation. Management of disaster projects, as in the case of the Bhopal gas tragedy, would not belong to the same category as that of

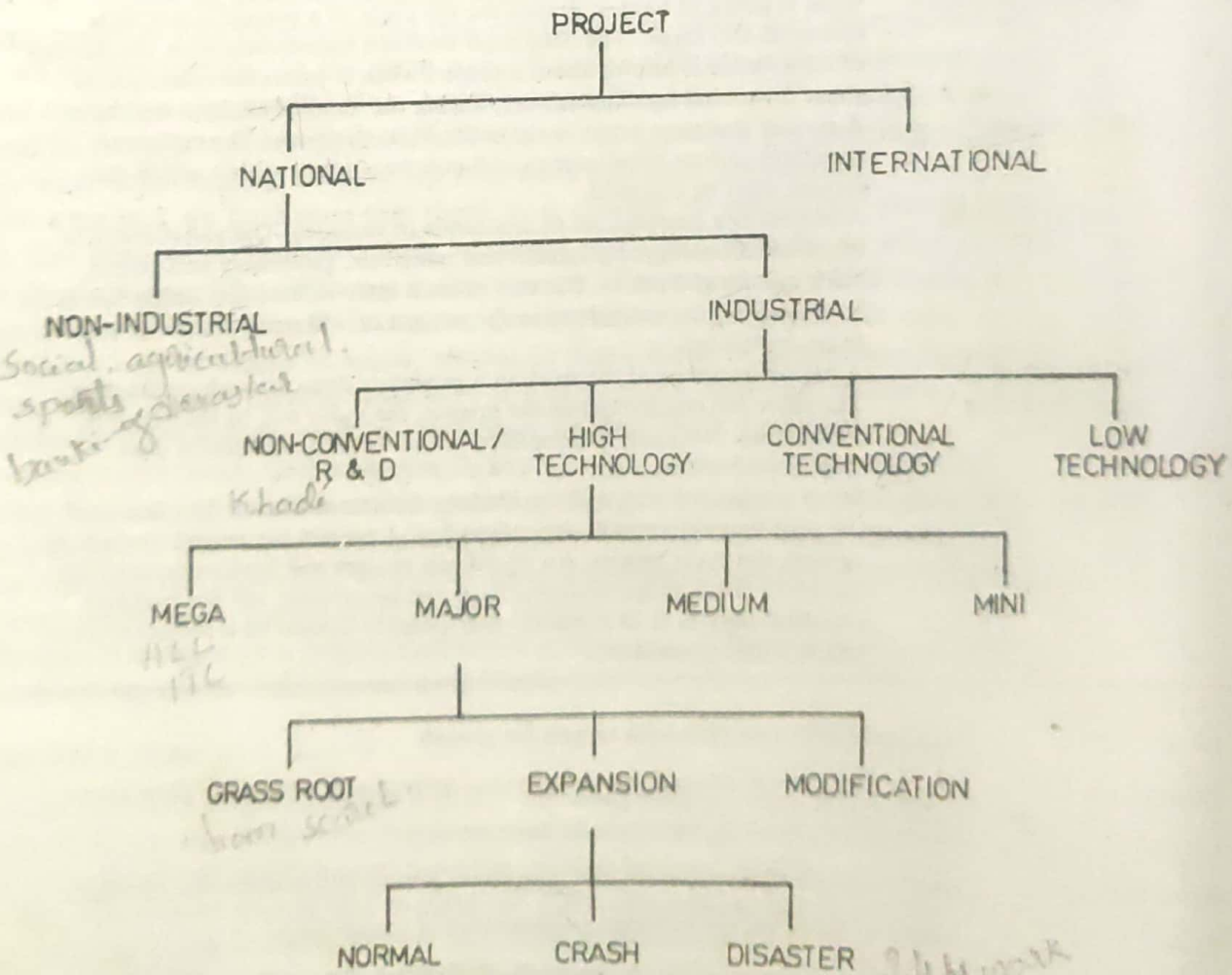

FIG. 1.2 Categories of projects

putting up a plant in a normal situation—say, the same insecticide plant itself. The Asiad project is another example which was not exactly normal and illustrates the point that any another project would not be executed in the same way. Depending on the speed needed for execution of a project, there can be further categorisation as below:

Normal Projects In this category of projects adequate time is allowed for implementation of the project. All the phases in a project are allowed to take the time they should normally take. This type of project will require minimum capital cost and no sacrifice in terms of quality.

Crash Projects In this category of projects additional capital costs are incurred to gain time. Maximum overlapping of phases is encouraged and compromises in terms of quality are also not ruled out. Savings in time are normally achieved in procurement and construction where time is bought from the vendors and contractors by paying extra money to them.

Disaster Projects Anything needed to gain time is allowed in these projects. Engineering is limited to make them work. Vendors who can supply 'yesterday' are selected—irrespective of the cost. Quality short of failure level is accepted. No competitive bidding is resorted to. Round-the-clock work is done at the construction site. Naturally, capital cost will go up very high, but project time will get drastically reduced.

PROJECT LIFE CYCLE PHASES

The attention that a particular project receives is again not uniformly distributed throughout its life span, but varies from phase to phase. At a particular phase of project life, depending on the requirement of that phase, appropriate attention has to be paid. We, therefore, need to know the various phases in the life of a project. By and large, all projects have to pass through the following five phases:

1. Conception phase
2. Definition phase
3. Planning and organising phase
4. Implementation phase
5. Project clean-up phase

While ideally these phases should follow one another in sequence, this rarely happens in real life. Not only do the succeeding phases overlap with the preceding ones, it is also not too uncommon to find complete overlap of all the phases. Sometimes this overlapping is done deliberately in the interest of compressing the overall project schedule. There are others who would encourage natural growth. To understand this aspect fully, we need to discuss the life cycle phases in a little more detail.

Conception Phase

This is the phase during which the project idea germinates. The idea may first come to the mind when one is seriously trying to overcome certain problems. The problems may be non-utilisation of either the available funds, plant capacity, expertise or simply unfulfilled aspirations. When one is seized with the problems, he looks in and around to find out ways of overcoming them. It may so happen that an idea will suddenly come to his mind as he surveys the environment. It is also possible that ideas will be put to him by his well wishers

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or those working on the problems for him. Whatever may be the case, the ideas need to be put in black and white and given some shape before they can be considered and compared with competitive ideas.

An operating cement plant may be having low capacity utilisation, high power consumption and consequently higher cost of production. In such a situation it might be a good idea to introduce new technology, replace some critical items selectively or scrap the plant altogether. There may be financial constraints, the existing staff may need to be on roll, limestone deposits may last for limited number of years and so on. The ideas need to be examined in light of objectives and constraints and what finally becomes acceptable may form the future project. All projects are usually conceived this way.

It is easy to appreciate that if this phase is avoided or truncated, the project will have innate defects and may eventually become a liability for the investors. In this phase, however, it is not supposed to be considered as to how the project will be implemented. Considerations of later phases of a project life when the project is not even born will not only prolong this period but may end up in unnecessary arguments. It is just like considering which medical college your child would be admitted to when the child is still in the womb.

A well-conceived project will go a long way for successful implementation and operation of a project. It is quite possible that ideas may undergo some changes as the project progresses. This is understandable since at the conception stage all pertinent data are not available and also the real life scenario may undergo considerable change compared to what may have been assumed initially.

Definition Phase

The definition phase of the project will develop the idea generated during the conception phase and produce a document describing the project in sufficient details covering all aspects necessary for the customer and/or financial institutions to make up their minds on the project idea. The areas to be examined during this phase, say for a cement plant, may be as follows:

1. ***Raw materials*** Qualitative and quantitative evaluation of limestone reserves.

2. ***Plant size/capacity*** Enumeration of plant capacity for the entire plant and for the main departments.

3. ***Location and site*** Description of location supported by a map.

4. ***Technology/process selection*** Selection of optimum technology, reasons for selection and description of the selected technology.

5. ***Project layout*** Selection of optimum layout, reasons for selection and appropriate drawings.

6. ***Plant and Machinery*** Selection of optimum equipment, reasons for selection, description of selected equipment and machinery, stating number, type, specifications, capacity, source and cost.

7. ***Electrical and instrumentation works*** Listing the broad features of the major electrical and instrumentation items, suggesting a broad scheme for power distribution and power grid map.

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8. *Civil engineering works* Selection of optimum civil works, reasons for selection, description of selected civil work and cost estimates.

9. *Utilities—fuel, power and water* Selection and description of utilities stating qualitative properties, quantities, source, availability and unit costs.

10. *Manpower and organisational pattern* Selection of labour and staff considering organisational structure/layout, skill requirement and level of training, availability and cost estimates.

11. *Financial analysis* Total investment costs, sources of finance, total production costs and evaluation of financial viability.

12. *Implementation schedule* This phase, therefore, clears some of the ambiguities and uncertainties associated with the formation made during the conceptual phase. This phase also establishes the risk involved in going ahead with the project in clear terms. A project can either be accepted or get dropped at this stage itself.

But what is the industry practice? In most cases, it may be seen that the effort during this phase is concentrated in protecting the project conceived during the conceptual stage. Anything else would amount to killing an embryo. What, therefore, sometimes comes out at this stage is what will satisfy the customer or the bank authorities. No wonder this phase is repeated—sometimes with different agencies and under different names. Sometimes studies in further depth are also asked for. But it is clear, if this phase is not done properly, it will increase the risk content of the project. Haste makes waste. Further, avoidance of this step or allowing this phase to proceed with the implementation phase can be expensive and often disastrous for the project. This has led the bank authorities to introduce strict appraisal procedures for the clearance of a project. Thus, ideally, a project can be said to have been born only after it has been cleared for implementation at the end of the definition stage. We will discuss more on this subject in Chapter 2.

Planning and Organising Phase

This phase can effectively start only after definition phase but in practice it starts much earlier, almost immediately after the conception phase. This phase overlaps so much with the definition and also with implementation phases that no formal recognition is given to this by most organisations. Some organisations, however, prepare documents such as *Project Execution Plan* to mark this phase.

By and large, organisations, during this phase, deal with the following, and in most cases take necessary action for realisation of the same.

1. Project infrastructure and enabling services
2. System design and basic engineering package
3. Organisation and manpower
4. Schedules and budgets
5. Licensing and governmental clearances
6. Finance
7. Systems and procedure
8. Identification of project manager

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9. Design basis, general conditions for purchase and contracts
10. Site preparation and investigations
11. Construction resource and materials
12. Work packaging

Thus, this phase is involved with preparation for the project to take off smoothly. This phase is often taken as a part of the implementation phase since it does not limit itself to paper work and thinking but many activities, including field work, are undertaken during this phase.

Planning, as it is often defined, is making a decision in advance. If this is not done, we will only be resolving crisis after crisis. It is, therefore, essential that this phase is completely gone through before the next phase, namely, the *implementation phase* starts. Many of the decisions and actions taken during this phase relate to project basics, and if the project jumps into the implementation phase without freezing the basics, the project is bound to falter and flounder if not fail altogether. We will discuss more about this phase in Chapter 3.

Implementation Phase

This is a period of hectic activity for the project. It is during this period that something starts growing in the field and people for the first time can see the project. Preparation of specifications for equipment and machinery, ordering of equipment, lining up construction contractors, issue of construction drawings, civil construction and construction of equipment foundations, equipment and machinery erection, plant electricals, piping, instrumentation, testing, checking, trial run and commissioning of the plant take place during this phase. As far as the volume of work is concerned, 80–85% of project work is done in this phase only. Naturally, therefore, people want to start this phase as early as they can. Since the bulk of the work in a project is done during this phase only, people will always want this phase to be completed in as short a time as possible. All techniques of project management, therefore, are applied to this area essentially.

This phase itself being more or less the whole project, every attempt is made to *fast track*, i.e., overlap the various sub-phases such as engineering, procurement, construction and commissioning to the maximum extent. This is besides starting the implementation stage itself in parallel with the earlier phases of the project life cycle. Hardly any project can afford the luxury of completing one implementation sub-phase fully before moving on to the next.

The amount of fast tracking will, however, depend on who is doing the project. If design is done by one agency and construction by another, then the scope for fast-tracking becomes very limited. If, on the other hand, design, supply and construction is contracted out as a total package, then the contractor is in a position to use fast-tracking to the maximum extent possible. It is this and many such requirements of this phase that have given birth to what is considered modern project management.

This phase, because of its peculiarities, has a high need for coordination and control. People may take months and years in taking decision on the project, but once the project is cleared and enters the implementation phase every one will like the time lost in the earlier phases to be made up during this phase only. Such being the case, meticulous coordination and high pressure management and control is required during this phase. Figure 1.3 lists the sub-phases and shows the extent of fast tracking in this phase of project life.

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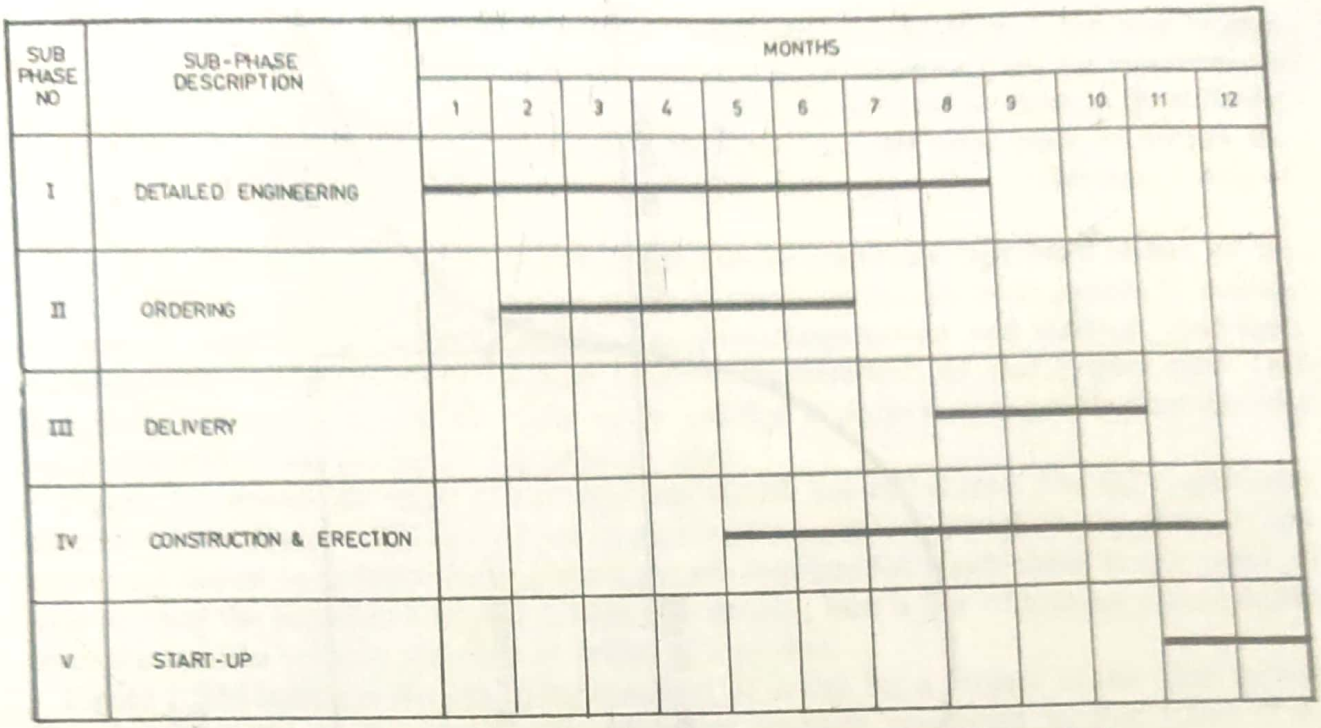

FIG. 1.3 Sub-phases of project implementation for an engineering project

Project Clean-up Phase

This is a transition phase in which the hardware built with the active involvement of various agencies is physically handed over for production to a different agency who was not so involved earlier. For project personnel this phase is basically a clean-up task. Drawing, documents, files, operation and maintenance manuals are catalogued and handed over to the customer. The customer has to be satisfied with guarantee-test runs. Any change required at the last minute for fulfilment of contractual obligations in respect of performance has, therefore, to be completed during this phase to the satisfaction of the customer. Project accounts are closed, materials reconciliation carried out, outstanding payments made, and dues collected during this phase.

The most important issue during this phase is planning of the staff and workers involved in execution of the project. All project personnel cannot be suddenly asked to go. Preparation for project clean-up has, therefore, to start a long time before actual physical handover. The first to go are design engineers and in their place few design engineers may be posted at field for residual engineering. This will be followed by other engineers—most of the time in the order in which they came in. Their places will be taken by customer's engineers who may be either for production or maintenance. The same people will never be required again at that site till a new project comes.

Project Life Cycle Curves

The project life cycle phases form an interesting pattern indicative of growth, maturity and decay almost similar to the human life. Figure 1.4 shows a typical project life cycle curve. The curve shows the various phases in sequence and the approximate effort involved in each phase, though in real life the phases will overlap. It can be seen from the curve that effort

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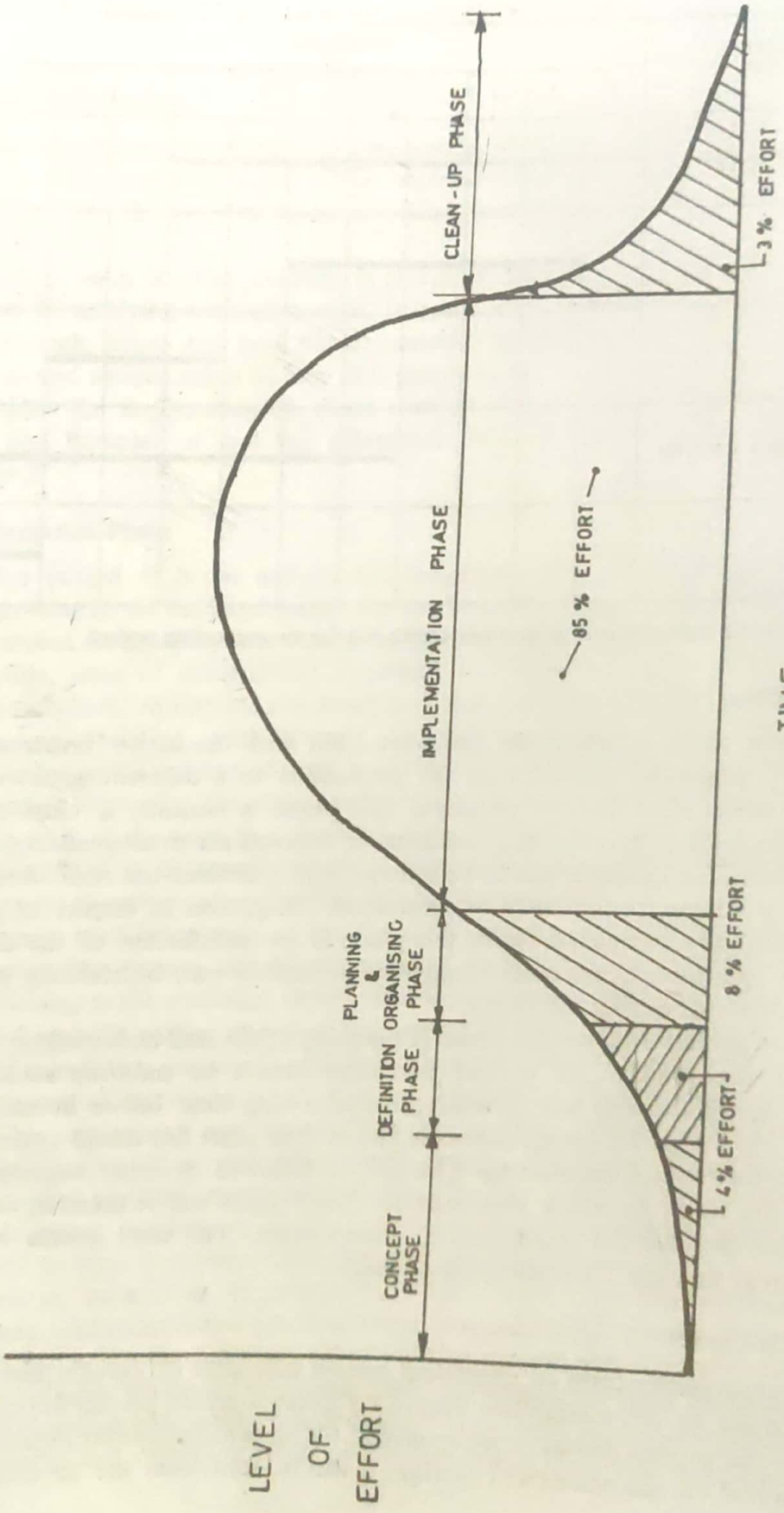

FIG. 1.4 Project life cycle curve

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build-up in a project is very slow but effort withdrawal is very sharp. It can also be seen that time taken in the formative and clean-up stages together is more than the implementation stage. While this pattern is true for all projects, the per cent of effort in the different phases would not be the same for all projects. However, for the same class of project the curve may be more or less the same. A life cycle curve can, thus, represent a class of project.

This parabolic pattern of growth, maturity and decay manifests itself in all phases of the project life. Thus, in the implementation phase of a project, the life cycle pattern is evident in detailed engineering, ordering, delivery, construction/erection and start-up. And for a particular class or projects this pattern may be characteristic of that project class. This knowledge of a characteristic life cycle curve enables a project manager to ascertain the state of health of any project at any point of time.

Figure 1.5 shows life cycle curves and associated line of balance. The life cycle curves here have been drawn in 'S' curve form to represent cumulative growth at any time. If the curves are drawn to indicate the minimum growth required for a sub-phase at any point of time to meet the targetted completion date of a project, then a line of balance can be drawn from the same to indicate the state of health of a project.

Figure 1.5(b) indicates the qualifying standard of health for a project at the 18th month. This has been drawn by reading the minimum progress prescribed in Fig. 1.5(a). If the actual progress in any of the sub-phases falls short of the qualifying work for that sub-phase, then that sub-phase is sick and requires treatment. Thus the concept of a characteristic life cycle curve for a project phase is very useful for the management of a project. We will discuss more about life cycle curves and line of balance in Chapter 4.

Project Visibility

A project cannot be seen for most of its life time. It starts with everything vague and fluid and for almost half of its life span it shows no concrete benefits. Only towards the end of the project people seem to be seeing the project. Though we have made it clear at the beginning that a project is not a plant, people seem to have problems in accepting the fact. Accountants, in particular, want solid proof of progress before they release payment. While proof of progress can be given, it may not be possible to produce 'solid' evidence for verification.

This non-visibility of a project also causes problems for its management. How to grapple with a thing which is yet to come and be seen? A project becomes visible slowly as it grows. Initially, one can only imagine what it would eventually be, but only the passage of time can give it a concrete shape. At any point in the life cycle something will be clearly visible, something nearly visible, but the rest will still have to be imagined. Figure 1.6 shows the conceptual model explaining this phenomenon. At t_1, visibility is zero—it requires total projection. At t_2 time, part of the project preceding time t_2 becomes visible, and something upto t_3 may become nearly visible—the rest will still have to be a projection. One who wants to know a project has, therefore, to go on projecting all the time to get an idea of the reality—since there is simply no other way. Perhaps this aspect of the project life would justify the term project being used to describe the efforts of multitudes of men and machines engaged in the conversion of an idea into reality.

While visibility demonstrates progress, it may not mean much to some people. To the

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One has not done any work but merely involved himself in exercising motions till the ultimate objective is achieved. This concern for the ultimate objective is the motivating force for the project Management approach.

To practise project management one must be able to distinguish what is part and what is whole—what is motion and what is work. Unless this is fully driven into everyone's mind, energy will be wasted in useless motions. The project management approach is, therefore, a necessity for all of us whether we are building a multi-billion dollars high technology project or running a simple automobile shop for it simply means *dedicating ourselves to the end objective and keeping the totality in focus all the time.*

Project management, like functional management, will require getting things done through people but with a little difference. The people this time will be more in number from the environment than the people within the organisation. Naturally, they will also not be bound by the organisation's own work ethics and discipline. We may be required to get the work done much the same way we do in our social setting. Many may find this uncomfortable, as it would require a lot of patience and skilled listening and negotiating capability.

Besides, in project management the work gets done mostly through lateral and diagonal contacts, the hierarchical protocol is almost non-existent. Communication is faster, decisions are taken quickly and at a lower level and unnecessary repetition of reports to involve and apprise authorities at higher levels for routine and petty decisions are avoided. But while the freedom exists for communication, sorting out problems and decision making commensurate with responsibilities at lower level, the higher level are always kept informed and involved if the situation so demands. This style of operation is characteristic of project management—whether the structure is purely projectised, matrix or functional. The protocols of the organisational hierarchies, salary levels and designations are all unimportant as far as working relationships are concerned. Project management presupposes that the human organisation is created to manage a physical system which has a natural inter-relationship and interdependence and therefore, the human system must correspond to the physical system and respond to the demands of the physical system without creating another artificial system based on class, creed and colour. Ideally the human organisational system should be a mirror image of the physical system, but this again is not possible no matter how much we may like it to be identical. But we cannot, at the same time, forget that it is the physical system which came first and is the basic issue in hand. We will discuss more on this in Chapter 3.

Many may also not like to projectize their outlook, i.e. look all the time at the future, foregoing the pleasures of digging and delving into the past for finding out whom to apportion blame for any failures in the past. But overriding all this may be the desire, not to be tied down to *targets, budgets, specifications and performance guarantees* which project management demands. Who would like to be chained if it is possible to live free?

TOOLS AND TECHNIQUES FOR PROJECT MANAGEMENT

Project management has a special set of techniques. But project management like any functional management is not technique only. The techniques are the *scientific* part of management—but then there is also the *art* and *politics* of management, and one could ignore them only to one's peril. For quite some time project management was equated with PERT/CPM but it did not take long for them to get disillusioned. This should not mean

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that PERT/CPM has failed; what it really reflects is that it would be totally amateurish to assume that techniques however powerful and versatile could scientifically deal with issues of management which are non-scientific in nature.

What the scientific part of management and scientific techniques lack is *human wisdom*, which one may like to term as the art and politics of management. The scientific techniques will only tell what is right, but it will require right understanding of the organisation, the people in the organisation, the mood of the people, an uncanny sense of what will go and what will not and a good sense of timing to achieve its right implementation. The techniques, therefore, may provide only as to *what* is to be done, but it will require additional knowledge as to *how* it should be done and get it done through people. The techniques have no answer for the same—it can be learnt only through practical experience.

Notwithstanding the above limitations, there are several techniques which would contribute significantly towards effective project management. These can be broadly grouped under the following heads:

1. Project selection techniques—
   (a) Cost benefit analysis and
   (b) Risk and sensitivity analysis
2. Project execution planning techniques—
   (a) Work breakdown structure (WBS)
   (b) Project execution plan (PEP)
   (c) Project responsibility matrix and
   (d) Project management manual
3. Project scheduling and coordinating techniques—
   (a) Bar charts
   (b) Life cycle curves
   (c) Line of balance (LOB) and
   (d) Networking techniques (PERT/CPM)
4. Project monitoring and progressing techniques—
   (a) Progress measurement technique (PROMPT)
   (b) Performance monitoring technique (PERMIT) and
   (c) Updating, reviewing and reporting technique (URT)
5. Project cost and productivity control techniques—
   (a) Productivity budgeting technique
   (b) Value engineering (VE) and
   (c) COST/WBS
6. Project communication and clean-up techniques—
   (a) Control room and
   (b) Computerised information systems

There are many such techniques which though without any label have standard application methodology. We will discuss these techniques in the subsequent chapters, not as separate techniques, but in relation to their application for the problems in hand.

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Realising this need, some universities abroad have now started post-graduate programmes in project management. Except for a correspondence course in Punjabi University, Patiala, we do not know of any university offering similar programmes. The Project Management Association, New Delhi, was probably the first organisation in India to realise this need and have so far conducted five part-time post-graduate programmes in project management of one-year's duration each. It appears we will also have to introduce at our universities full-time postgraduate programmes in project management in the not-too-distant future to improve performance of project management.

ROLES AND RESPONSIBILITIES OF PROJECT MANAGER

But then what should be the contents of such a programme? A consensus on the same has not been reached as yet. Meanwhile, it may be worthwhile for us to discuss what are our expectations from the project manager and leave it to the educational planners to design the curriculum for the education and training of project managers.

But can we easily agree on a unique set of roles and responsibilities for a project manager? It would appear that these may vary depending on the agency a project manager represents. Of course, the roles and responsibilities of the owner's project manager would not be exactly the same as that of the prime contractor or that of a project management consultant, but then should we necessarily assume that they are all project managers simply because they are so designated?

Figure 1.11 shows one type of arrangement for the execution of a project. There could be several variations of the execution arrangement and we will discuss some of these in

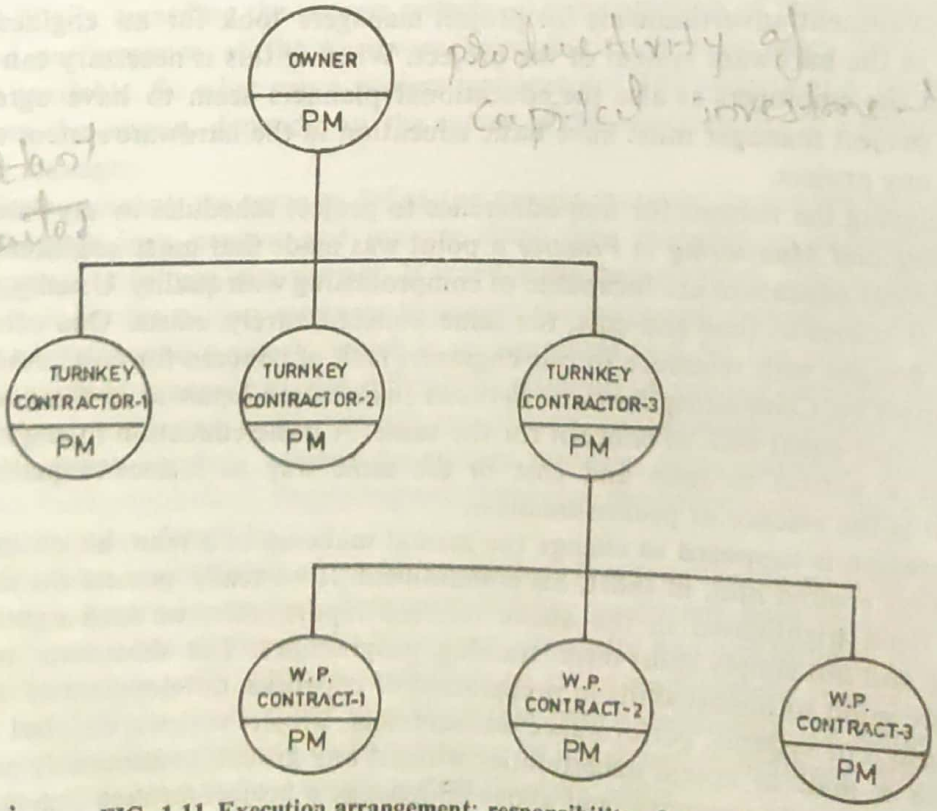

FIG. 1.11 Execution arrangement: responsibility of a project manager

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Chapter 3. Figure 1.11 reveals that there could be several project managers in a project and their roles and responsibilities would not be the same. Take, for instance, the owner's project manager. He has a responsibility to ensure that productivity of the capital investment in the project is the highest, i.e. the owner company should be able to build more projects or more saleable products or outputs with same or lesser capital investment. Now the project manager for a work-package contract could not be charged with this responsibility. His job is to complete the scope of work entrusted to his company as per contract specifications. He would really not be interested in proposing relaxation of certain specifications or elimination of certain items of work which merely add to the cost of the project but not to the value just because it would improve capital productivity. Roles and responsibilities of project managers will vary. For that matter, one may also conclude that the scope of project management would depend on the participating agency. Accordingly, there could be different types of project management, namely, project management by owner, project management by consultant, project management by contractor, etc.

To be true to the definition and concept of the project and that of project management, we should not accept such views. Accordingly, while a sub-contractor may designate his manager as project manager, what he performs should not represent the complete roles and responsibilities of a poject manager. In fact, they are only discharging certain limited roles and responsibilities which have been delegated to them; they are not discharging the total function of project management. A project manager should have fixed roles and responsibilities, and if it so happens that due to the design of project execution arrangement, a sub-contractor's manager also performs the same, then and then alone, we should call him a project manager. This approach is necessary to ensure inculcation of professional ethics and development of a body of knowledge which will meet the need of all types of project managers.

The basic roles and responsibilities of a project manager that we are referring to could be grouped under twelve heads:

1. Defining and maintaining the integrity of a project
2. Development of project execution plan
3. Organization for execution of the plan
4. Setting of targets and development of systems and procedures for accomplishment of project objectives and targets
5. Negotiation for commitments
6. Direction, coordination and control of project activities
7. Contract management.
8. Non-human resource management including fiscal matters
9. Projectising and problem-solving
10. Man management
11. Satisfaction of customer, Government and the public
12. Achievement of project objectives, cash surplus and higher productivity

Some of the above roles and responsibilities can be considered as general management capabilities—we, therefore, shall not discuss these in this book. Only the areas which are peculiar to project management need to be discussed—and accordingly we shall discuss these in detail in the subsequent chapters.

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